E-pHEMT MMIC AE417

Product Features

- Small size
- 5 ~ 1100MHz (1dB Flat)
- High gain
- High linearity
- Higher productivity
- Low cost

Applications

- Low Noise Amplifier for CATV, Satellite
- Cable Modem
- FTTH (G-PON, GE-PON)
- Optical node

Package Type : SOT-89

Description

AE417 is designed as low cost drive amplifiers for many applications including FTTH, CATV System.
This MMIC is based on Gallium Arsenide Enhancement Mode pHEMT which shows low current draw and very low noise.
The data in this spec sheet is valid only for 75 ohm application. 50 ohm data is in a separate spec sheet.

Electrical Specifications

PARAMETER		UNIT	MIN	TYP	MAX	CONDITION
Frequency		MHz	5	-	1100	-
Gain		dB	13	15.5 14	-	5 ~ 200MHz 30 ~ 1000MHz
Gain Flatness		dB	-	1	-	10 ~ 1100MHz
Input Return Loss		dB	-	-18	-12	-
Output Return Loss		dB	-	-16	-14	-
Output IP3		dBm	38	41	-	@ 500MHz/5dBm 2tone
1dB Compression Point		dBm	22	25	-	@ 500MHz
Noise Figure		dB	-	3	4	5 ~ 1000MHz
CSO	50 ~ 870MHz	dBc	-	-63	-	135Channel@30dBmV/Ch
CTB		dBc	-	-73	-	
XMOD		dBc	-	-76	-	
DC Current		mA	-	120	-	Vdd = 8.0V

Note
1. Test conditions unless otherwise noted. Test Freq = 500MHz, T=25℃, Vdd=8V, 75Ω system
2. OIP3 measured with 2 tones at an output power of +5dBm/tone separated by 1MHz, Test Freq = 500MHz

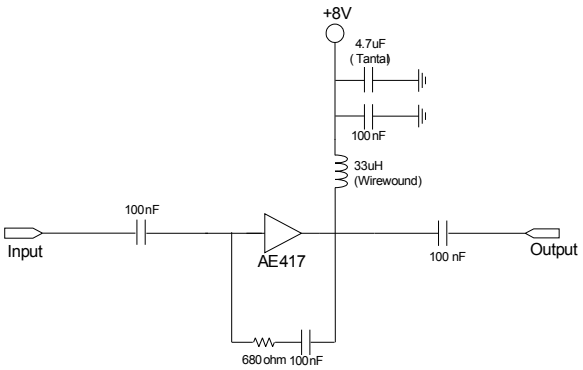
Absolute Maximum Ratings

PARAMETER	UNIT	MIN	TYP	MAX
Device Voltage	VDC	-	8	12
Operating Case Temperature	℃	-40	-	85
Storage Temperature	℃	-40	-	150
ESD Human Body Model	-	-	Class 1B	-
Moisture sensitivity Level	-	-	MSL1	-
Junction temperature	℃		-	180
Thermal Resistance (Rth)	℃/W		50	

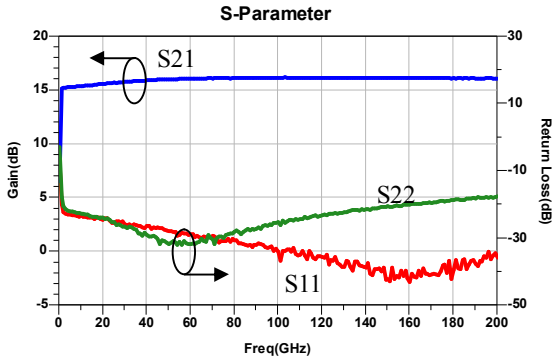
Application Circuit @ 5 ~ 200MHz, 75ohm System

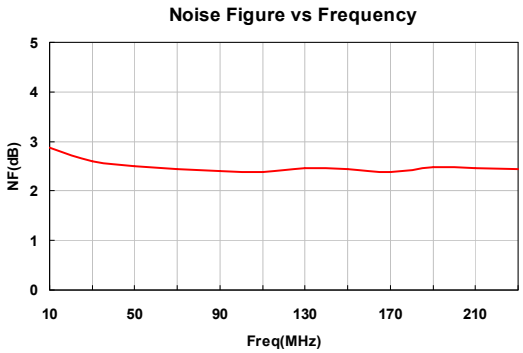
PARAMETER	UNIT	TYPICAL			
Frequency	MHz	5	25	50	100
Gain(S21)	dB	15.5			
IRL(S11)	dB	-23	-25	-28	-34
ORL(S22)	dB	-22	-25	-31	-25
Output IP3	dBm	40.5	41.5	42.5	42
P1dB	dBm	21	22.5	24	24.5
Noise Figure	dB		2.7	2.5	2.4
CSO(1)	dBc	-67			
CTB(1)	dBc	-81			
XMOD(1)	dBc	-73			
Current	mA	120			

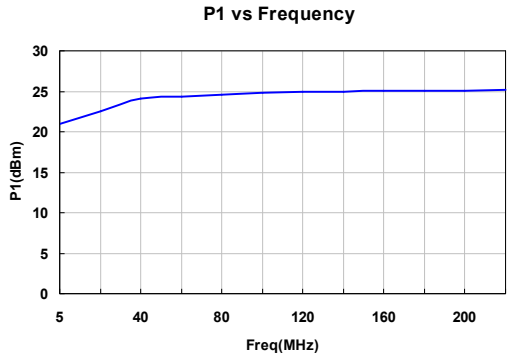
(1) 8channels, +45dBmV/ch

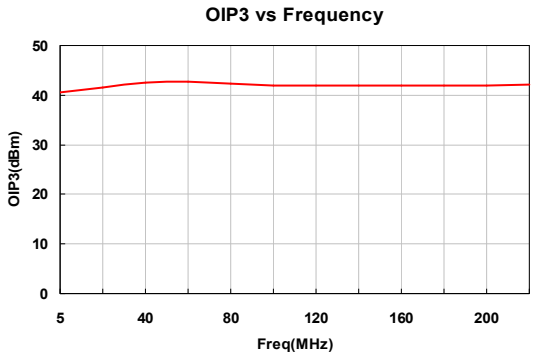


Typical Performance @ VDD=8V, IDS=120mA, T=25℃, 75ohm System









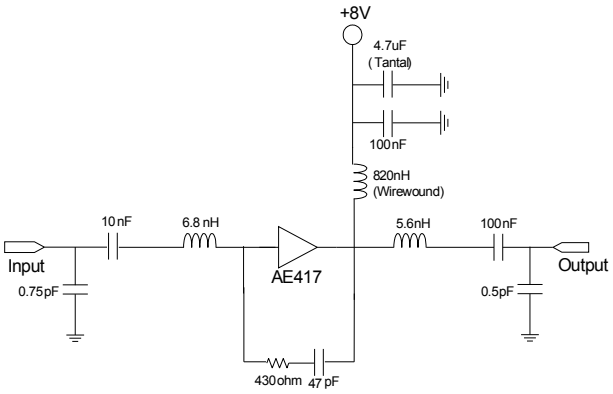
Multi-Tone : Test 8CH_FLAT@Output Power +45dBmV/Ch

Level : +45dBmV Tilt : 135CH_FLAT										
FRQ	**XMD (NCTA)**	**CTB RAW**	**CTB COR**	**N-FLR**	**CSU RAW**	**CSU COR**	**CSU FRQ**	**CSL RAW**	**CSL COR**	**CSL FRQ**
7	73.4	82.1	82.5	92.4	91.4	95.7	7.66	65.3	65.3	5.99
31	74.7	81.1	81.5	91.5	68.7	68.7	31.99	70.3	70.3	29.99
49	72.6	81.8	82.4	90.8	70.7	70.7	49.99	90.3	94.6	48.21
Min	72.6	81.1	81.5	90.8	68.7	68.7	7.66	65.3	65.3	5.99
Max	74.7	82.1	82.5	92.4	91.4	95.7	49.99	90.3	94.6	48.21

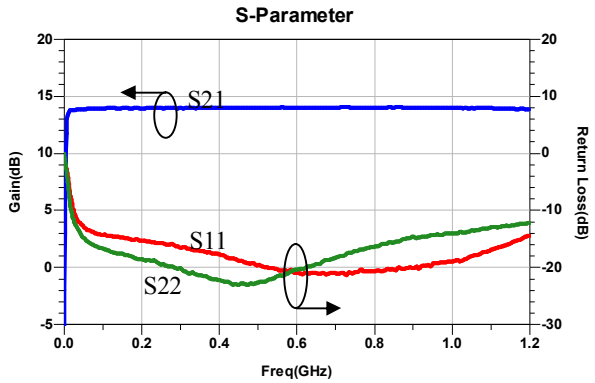
Application Circuit @ 30 ~ 1000MHz, 75ohm System

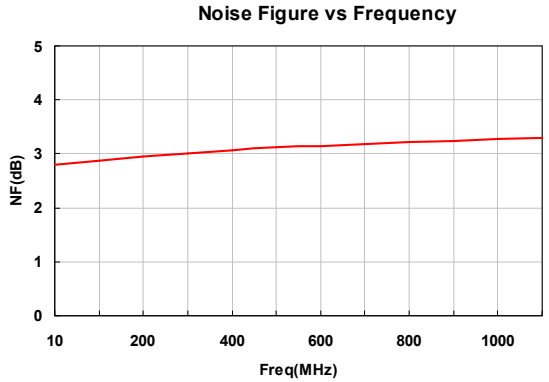
PARAMETER	UNIT	TYPICAL		
Frequency	MHz	30	500	1000
Gain(S21)	dB	14		
IRL(S11)	dB	-11	-19	-18
ORL(S22)	dB	-12	-22	-14
Output IP3	dBm	40.5	41.5	36.5
P1dB	dBm	22	25.5	24
Noise Figure	dB	2.8	3.1	3.3
CSO(1)	dBc	-62		
CTB(1)	dBc	-73		
XMOD(1)	dBc	-76		
Current	mA	120		

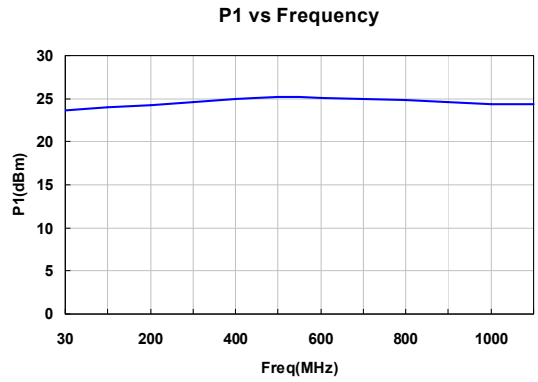
(1) 135channels, +30dBmV/ch

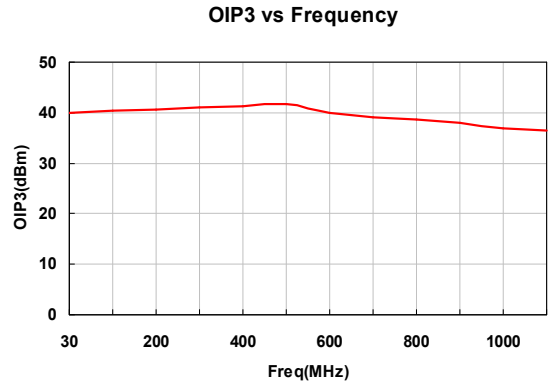


Typical Performance @ VDD=8V, IDS=120mA, T=25℃, 75ohm System









Multi-Tone Test : 135CH_FLAT@Output Power +30dBmV/Ch

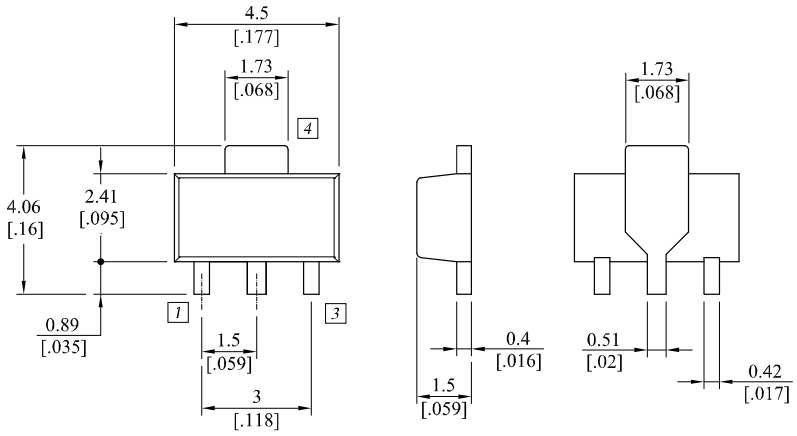
Level : +30dBmV Tilt : 135CH_FLAT										
FRQ	**XMD (NCTA)**	**CTB RAW**	**CTB COR**	**N-FLR**	**CSU RAW**	**CSU COR**	**CSU FRQ**	**CSL RAW**	**CSL COR**	**CSL FRQ**
55.25	76.8	76.5	80.8	77	76	80.3	55.99	62.6	62.7	53.99
77.25	79	76.2	80.5	76.5	62.2	62.3	77.99	76.3	80.7	76.38
109.25	79.3	76.5	80.8	77.3	75.2	79.5	109.99	62.2	62.3	107.99
211.25	78.7	76.4	80.7	77.1	75.2	79.6	211.99	62.7	62.9	209.99
331.25	78.5	74.4	78.7	75.7	73.5	77.9	332.49	63	63.2	329.98
445.25	78.6	74.9	79.3	76.6	72.9	75.5	446.48	63.2	63.4	443.99
547.25	78	72.9	77.3	74.3	70.5	72.7	548.49	63.3	63.6	545.98
637.25	77.6	73.1	77.4	75	69.1	70.4	638.49	64.8	65.2	635.98
745.25	77.3	72.4	76.7	74.5	67.4	68.4	746.49	67.2	68.1	743.98
859.25	75.9	71.1	75.4	72.6	65.5	66.3	860.49	71.8	76.1	858.49
Min	75.9	71.1	75.4	72.6	62.2	62.3	55.99	62.2	62.3	53.99
Max	79.3	76.5	80.8	77.3	76	80.3	860.49	76.3	80.7	858.49

Multi-Tone Test : 135CH_FLAT@Output Power +20dBmV/Ch

Level : +20dBmV Tilt : 135CH_FLAT										
FRQ	**XMD (NCTA)**	**CTB RAW**	**CTB COR**	**N-FLR**	**CSU RAW**	**CSU COR**	**CSU FRQ**	**CSL RAW**	**CSL COR**	**CSL FRQ**
55.25	94.4	80.3	84.6	80.4	79.5	83.8	55.99	71	71.5	53.99
77.25	99.5	80.4	84.8	80.8	71.4	72	77.99	80.2	84.5	76.17
109.25	95.5	80.1	84.5	80.6	80.2	84.5	109.99	71.5	72.1	107.99
211.25	97.8	79.9	84.2	80.2	79.5	83.8	211.98	72.8	73.6	209.98
331.25	95.7	79.2	83.6	79.6	78.9	83.3	331.99	72.8	73.7	329.99
445.25	96	80	84.3	80.6	79.2	83.6	446.49	73.2	74	443.99
547.25	97.6	78.6	82.9	78.8	77.2	81.6	548.49	72.6	73.8	545.98
637.25	94.1	78.5	82.8	78.6	76.7	81.1	638.49	73.9	75.5	635.98
745.25	97.2	78.3	82.6	78.6	75.5	78.6	746.49	75.8	78.8	743.99
859.25	94.3	76.6	81	77.1	73.7	76.7	860.48	76.6	81	858.5
Min	94.1	76.6	81	77.1	71.4	72	55.99	71	71.5	53.99
Max	99.5	80.4	84.8	80.8	80.2	84.5	860.48	80.2	84.5	858.5

Package Dimensions (Type: SOT-89)

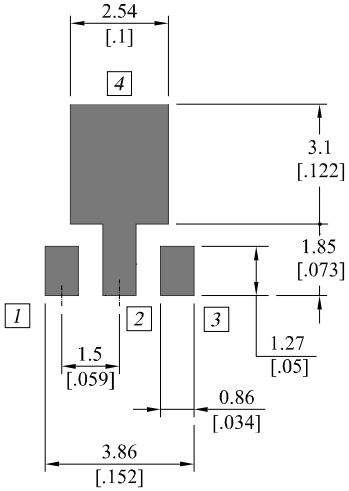
* Unit: mm[inch] | Tolerance ±0.2[.008]



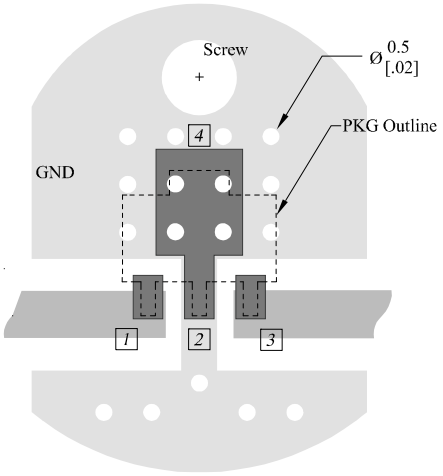
▲ Top View ▲ Side View ▲ Bottom View

Pin Description			
Pin No	**Function**	**Pin No**	**Function**
1	Input	4	GND
2	GND	-	-
3	Output / Bias	-	-

Recommended Pattern



Recommended Mounting Configuration



*** Mounting Configuration Notes**

1. Ground / thermal via holes are critical for the proper performance of this device.
2. Add as much copper as possible to inner and outer layers near the part to ensure optimal thermal performance.
3. Mounting screws can be added near the part to fasten the board to a heatsink. Ensure that the ground / thermal via hole region contacts the heatsink.
4. Do not put solder mask on the backside of the PCB in the region where the board contacts the heatsink.
5. RF trace width depends upon the PCB material and construction.
6. Use 1 oz. Copper minimum.

Revision History

Part Number	Release Date	Version	Modification	Data Sheet Status
AE417	2014.04.22	1.2	Absolute Maximum Ratings (Delete Tj Typ)	-
AE417	2012.10.15	1.1	New datasheet format	-